Occurrence of Juvenile Weatherfish *Misgurnus anguillicaudatus* (Pisces: Cobitidae) in the Yarra River

By S. Allen*

Introduction

Weatherfish or loach are Cypriniform fishes of the family Cobitidae. They have a Eurasian distribution with greatest diversity in South-east Asia. There are two species in the genus *Misgurnus*; the European *M. fossilis* and the Asian *M. anguillicaudatus*, the latter is also known as the Japanese weatherfish or dojo. Both are sturdy, elongate fishes with very similar life histories (Berra, 1981). They are popular aquarium fish and 100,000 cobitids per year are imported into Australia, comprising about 1 per cent of all imports of aquarium fish during 1978-80 (McKay, Queensland Museum, pers. comm.). The fish have been imported from Singapore for over 20 years, they are either caught in the wild in India or cultured in Taiwan, fish 50 mm in length being about the smallest individuals imported (Fallu, Fisheries and Wildlife Division, pers. comm.).

Despite their popularity as aquarium fish and their extreme mobility and hardiness, there are no previously published records of breeding populations becoming established in the wild in Australia. In this paper, the occurrence of juvenile *M. anguillicaudatus* in the Yarra River is reported together with other evidence of possible breeding populations in Australia. The general biology of the species is briefly reviewed.

Collection of the material

Three small weatherfish were found amongst routine collections of freshwater shrimps *Paratya australiensis* taken in the Yarra River approximately 1km downstream of the Warrandyte bridge (Map. Ref. 424214 Yan Yean sheet 7922-111) between January and March 1984. The collections were made by hand-held dip nets swept amongst aquatic vegetation along the edge of the river. One of the specimens was lodged with the Museum of Victoria (MV-A3310) (Table 1).

A further collecting trip to specifically collect weatherfish was undertaken on 3 April 1984. A section of the edge of the Yarra River was fished from 20m downstream to 100m upstream of the initial collection site using a back-pack electrofishing unit and hand-held dip nets with a mesh size of 1 mm. Another five juvenile weatherfish were collected (Table 1), all from a small area (about 2 m x 5 m) of dense aquatic vegetation adjacent to the main stream. The best results were obtained by pushing the dip nets into the muddy substrate. No weatherfish were taken by electrofishing, although a carp *Cyprinus carpio* 30 mm long and goldfish *Carassius auratus* and roach *Rutilus rutilus* 100 mm long were taken by this method.

Physico-chemical parameters in the Yarra River at Warrandyte between January and April 1984 were: water temperature 15-24 °C, pH 6.47-6.88, dissolved oxygen 5.4-8.0 mg/l and conductivity 137-148 uS/cm.

Discussion

The eight juvenile weatherfish collected in the Yarra River may be the progeny of a breeding population in the river or survivors of aquarium-bred fish released into the river. The absence of adults in the collection may be due to their burrowing habits, which would make them difficult to catch by electrofishing and dip-netting. Further collecting in the area is required to determine if the weatherfish have indeed

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Table 1

Collection Date 1984	Length (mm)	Weight (g)
20 February	50	0.69
20 February	31	0.15
5 March	45	0.45
3 April	60	1.42
3 April	54	0.87
3 April	25	0.07
3 April	2 fish not measured	

established a self-sustaining population in the river. This collecting should take place during the breeding season in spring when eggs and larvae may be detected. The collecting methods may also need to be modified to be more effective in taking adult fish.

Further evidence suggesting that weatherfish may have established breeding populations in the wild is the capture in the Australian Capital Territory of a gravid female *M. anguillicaudatus* (total length 175 mm, weight 45g) taken in Lake Burley Griffin on 24 September 1980, and the collection, in January 1984 of a juvenile specimen (estimated total length 65 mm, weight 1.7g) from Ginninderra Creek downstream of Lake Ginninderra (Krucolic, Department of the Capital Territory, pers. comm.).

Weatherfish are reported to tolerate water temperatures from 4°C to 32°C (McKay, pers. comm.). They are very efficient omnivorous scavengers and have a high fecundity, laying about 150,000 eggs per season on water plants or on mud between plant roots. They grow to 220 mm long and are sexually mature at 100 mm (Sterba, 1973).

Weatherfish can move across land and are reported to utilise oxygen from the air by gulping at the water surface, absorbing it through the highly vascular hind gut and expelling carbon dioxide through the vent. Their preferred habitat is a muddy substrate in which the fish can burrow, often leaving only the head protruding above the mud; they are also reported to aestivate (Walker, 1975). The name 'weatherfish' derives from the belief, so far unsubstantiated, that the fish becomes restless during changes in air pressure (Sterba, 1973).

Due to its relatively high fecundity, hardiness and mobility there is a high risk that weatherfish may establish self-sustaining populations in the wild as has happened with several other species of exotic freshwater fish in Victoria (Cadwallader and Backhouse, 1983).

Exotic species, and even Australian native species introduced into an area where they were not the natural inhabitants, can cause severe disruption to the natural species. The introduced species may compete for food items, shelter and nesting sites, prey on native species or their eggs and, in some cases, alter the habitat thus the food chain through either eating the aquatic plants or disturbing the substrate. As a result the water quality, especially turbidity, can be quite drastically altered. Any of these disturbances may lead to the elimination or extinction of native species. It is unlikely that *M. anguillicaudatus* will cause such drastic changes, however, the effects of this species on the habitat and native species are unknown at present. Careful monitoring of the situation is required and aquarists should be made more aware of the dangers inherent in dumping unwanted fish.

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Mammals and Reptiles of Holey Plains State Park

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Introduction

This paper presents data collected on the occurrence of mammals and reptiles in Holey Plains State Park in South Gippsland, 200 km E of Melbourne, (38° 14′ S, 146° 55′ E; Fig. 1). The data were collected during the course of a vertebrate survey of the Park by the Monash University Ornithology Club, between May 1978 and December 1980.

Study Area

Holey Plains State Park is a 10,800 ha area of natural bushland. Parr-Smith (1978) described 29 natural vegetation alliances on the predominantly sandy soil, based on associations of dominant species. These can be divided into seven structural groups: low woodland, woodland, open woodland, open forest, regenerating scrub, closed scrub and swamp. Various understorey types occur, with mixed species heath, and bracken dominated heath being common over most of the Park.

The plains themselves are mostly less than 150 m a.s.l., but the gently sloping hills lead to a peak of 218 m at Holey Hill. The Park, surrounded by cleared agricultural land and pine plantations, is bounded by the Rosedale-Longford Rd. to the north and Merriman's Ck., to the south. Numerous marshes and lakes occur in the eastern sector of the Park. Pine plantations (approximately 450 ha) also occur within the outer Park boundary, and passing through the northern sector are two, 50 m wide easements for oil and gas pipelines. A limestone quarry and two gravel pits are also located within the Park.

The area experiences warm summers (highest monthly mean of 19°C in February) and cool winters (lowest monthly mean of 9°C in July), with rainfall (650 mm p.a.) spread evenly throughout the year (L.C.C., 1972). Further information on climate, geology and physiography of Holey Plains State Park can be found in the Report On The South Gippsland Study Area (District 2) (L.C.C., 1972).

Methods

Data were collected on ten weekends and two week-long visits. Survey techniques included small mammal trapping (aluminium folding traps 9 x 9 x 32 cm), spotlighting, bat catching (netting and trip-lines across a dam) and chance observation.

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